GEOGRAPHIC SCHOOL BULLETINS

THE NATIONAL GEOGRAPHIC SOCIETY, WASHINGTON 6, D.C.

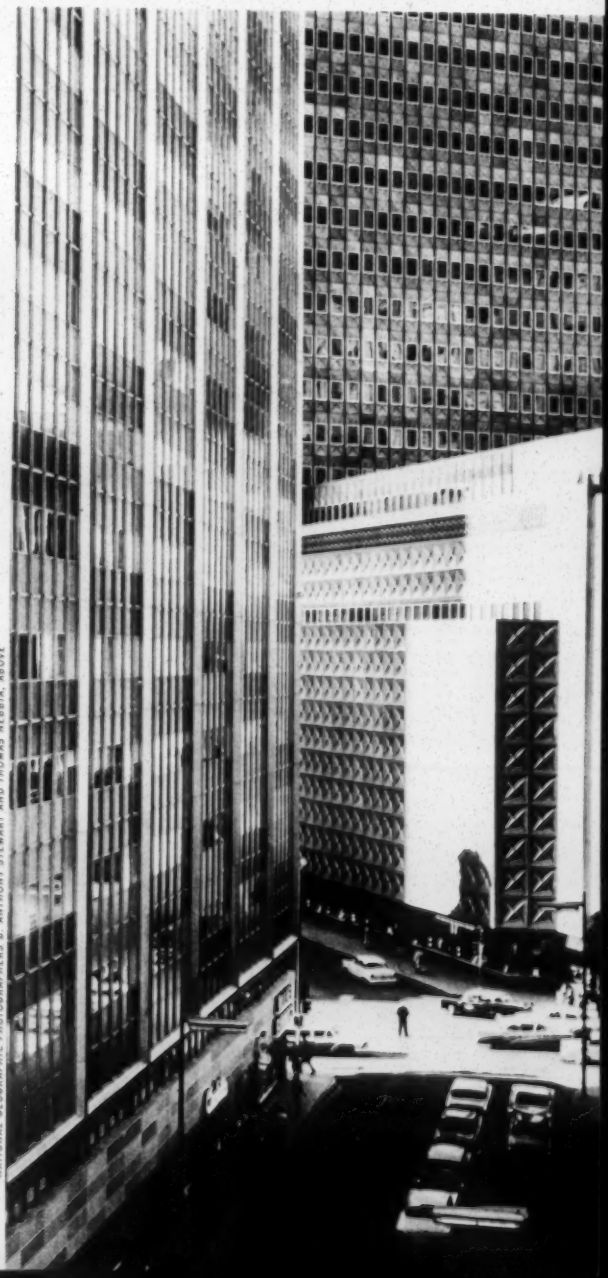
MARCH 6, 1961, VOLUME 39, NUMBER 21 . . . *To Know This World, Its Life*

Texas

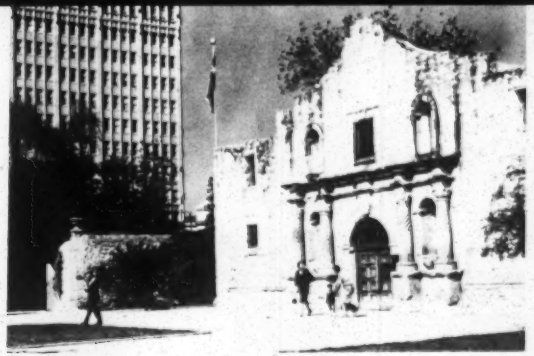
also—

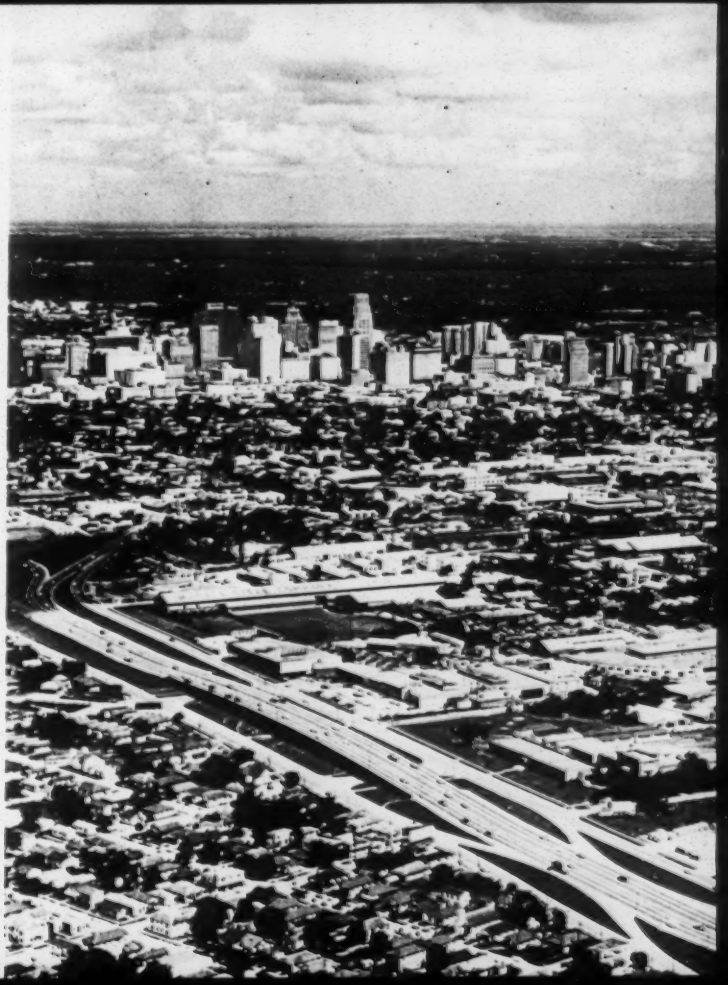
- Geysers
- Offa's Dyke
- African Insects

Cowpuncher and Cliff-dwellers: A lifetime in wind and sun has etched the face of a ranch foreman, above. The cattleman is still a big shot in Texas, and even the oil millionaire may buy a ranch for a final roundup of prestige. But the 1960 census reveals that cities have corralled most Texans. The results are canyons of glass, stone, and steel like that at the intersection of Ervay Street and Pacific Avenue, Dallas, right. Since the end of World War II, this metropolis has constructed more office buildings than any other United States city except New York.



NATIONAL GEOGRAPHIC PHOTOGRAPHERS B. ANTHONY STEWART AND THOMAS NEBBIA, ABOVE





Remember the Alamo but look at Houston! The Lone Star flag flies over the San Antonio shrine, left, where heroic Americans died for Texas freedom. Modern Houston, right, was named for the man who gained final independence from Mexico. Today, with a population approaching a million, Houston ranks as the South's largest city and the nation's sixth.

day, 9.25 million head of cattle roam the state, almost one for each of the 9.5 million Texans.

The Lone Star State is the nation's leading beef producer. But cows are only part of the story. Texas, as you may have heard, is big, although demoted to second place among the 50 states when Alaska joined the Union in 1959. It blankets 267,339 square miles—more than the six New England states, New York, New Jersey, Pennsylvania, Delaware, Virginia, Ohio, and Maryland, put together.

From the Louisiana border to the Rio Grande Valley, the hot, low coastal plain stretches in a crescent beside the Gulf of Mexico. Here flourish fields of cotton, corn, rice, and citrus groves, forests of pine, and prairies of tall grasses for cattle to feed on. Behind this lowland rises the North Central Plains, girding the state's midsection from southwest to northeast—fine cattle, sheep, and goat country. The High Plains of the Panhandle, rich with wheat and oil fields, and a wild area west of the Pecos River—where spurs of the Rocky Mountains climb as high as 8,300 feet—complete the giant state.

Six flags—those of Spain, France, Mexico, the Republic of Texas, the Confederate States of America, and the United States—have flown over Texas.

TEXAS No Longer Biggest, But Plenty Big

PHOTOGRAPHS BY NATIONAL GEOGRAPHIC PHOTOGRAPHER B. ANTHONY STEWART

THAT LEATHERY OLD SALT of the plains, the Texas cowboy, still holds his place in the big state.

A helicopter flushes the dogies out of the brush for roundup, and a butane burner heats the branding iron, but the cowboys, like those above near Vernon, lasso and throw steers with the same guts that once wrangled longhorns on the Chisholm Trail.

In the old days, herds of these wild beasts grazed free and open Texas plains. All an enterprising cattleman had to do was catch them, brand them, and drive them nearly a thousand miles to Kansas or Missouri for shipment to eastern and northern meat markets.

After the Civil War, settlers pushed west. These "sod-busters" earned the cowman's hate by fencing the plains with a newfangled invention called barbed wire. But the railroads, threading down Texas way, eliminated the long trek north to market.

Cattlemen had all the money; so they bought up great chunks of the state, paying sometimes as little as a dime an acre, sometimes trading a horse for a good piece of land. The ranch at left, assembled in the decades after the Civil War, covers half a million acres. The famous King Ranch, with nearly a million acres, could engulf Rhode Island.

With ranges defined, the cowboy settled down to breeding instead of chasing cattle. New breeds were introduced—white-faced, hump-shouldered Herefords, Angus, Shorthorns, and the King Ranch's red, hump-backed Santa Gertrudis, a cross of Brahman and Shorthorn, immune to the Texas fever tick and able to survive long periods of heat and drought. To-

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created not only millionaires, but jokes about them. It's true that one Houston millionaire pays a private maid to take care of his French poodle, and it's true that a Dallas department store advertised in its last Christmas catalogue "his" and "hers" airplanes, $176,000 the pair.

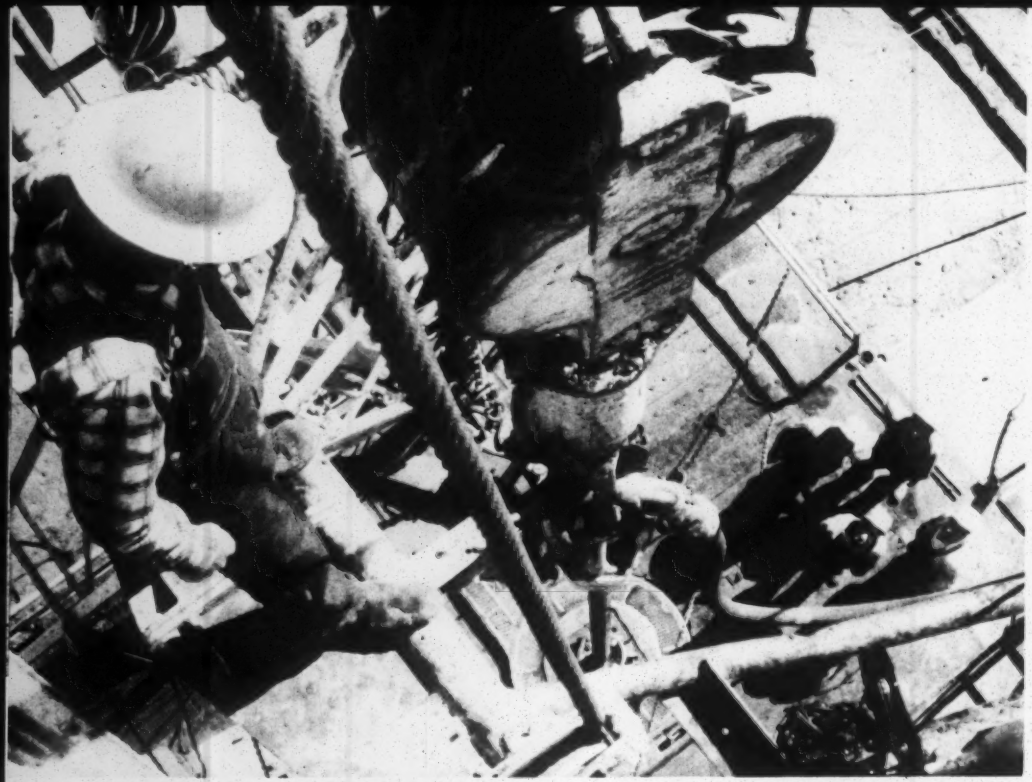
But the "real" Texan, described by Stanley Walker in the February, 1961, *National Geographic* as "a retiring, well-behaved, quiet fellow . . . about as bubbling a character as an old Maine or Vermont resident," resents both the jokes and the antics of the flamboyant few who inspired them.

This "real" Texan would prefer to talk—in moderate terms—of oil money bringing a higher level of education, public health improvements, factories and cities rising from the flat prairies.

He might add, though, that you can't drink oil, and tell how one governor urged the people to pray for rain; how a rancher left the country, leaving a sign on his pasture gate, "Be Back When It Rains."

For it's often either a drought or a flood in Texas. Both cities and croplands suffer. Some Dallas citizens have watched their lawns and shrubs wither away while they drank bottled water in preference to their normal source of supply.

The future begins to look a little brighter. Thousands of dams, big and little, have been built all over Texas to water fields, like that at left near Crystal City, where Mexican migrants plant cabbages, and to supply cotton growers like those whose bales are being loaded at Brownsville, below. A series of new dams rises on streams above Dallas. L.B.



PHOTOGRAPHS BY NATIONAL GEOGRAPHIC PHOTOGRAPHER THOMAS NEBBIA

The Spaniard Alonso de Pineda, in 1519, became probably the first white man to step on Texas ground. Spain sprinkled it with missions to convert the pagan Indians. The French followed, but Indians wiped out their colony, Fort Saint Louis. When Mexico broke away from Spain in 1821, Texas became part of the Republic of Mexico.

That same year, however, Stephen F. Austin brought Americans to Texas to settle. For the next nine years, American colonies in Texas grew. But the individualistic Americans refused to bow to Mexican domination. They revolted in 1835, formed their own government, and attacked Mexican strongholds. Alarmed, the Mexicans marched on the Alamo in 1836. The Mexicans won the battle but lost the war.

Texans remembered the Alamo, where every man in the garrison, including Davy Crockett and Jim Bowie, was killed. At San Jacinto, led by Sam Houston, they took control of Texas forever from Mexico.

The independent Republic of Texas lived for nine years, then was admitted to the United States.

For its fabulous boom, Texas must thank oil, discovered in 1866 near Nacogdoches. Production remained a trickle until the Spindletop Field, near Beaumont on the Gulf Coast, boosted output. Other fields were discovered, in the north, east, and central parts of the state, in the Panhandle, and the Pecos Valley. The biggest field of all opened in 1930 when No. 3 Daisy Bradford blew in near Kilgore.

Today nearly half a million wells stud the state, with more on their way. Probing for new sources, drillers at left sink a hole west of Midland. Texas leads the nation in oil production—24 billion barrels to date.

Tremendous wealth from the black gold

NATIONAL GEOGRAPHIC PHOTOGRAPHER VOLKMAR WENTZEL

In only three places in all the world can you see these explosive jets. One is Iceland, another New Zealand. But the biggest regular geysers and largest number are in Yellowstone National Park.

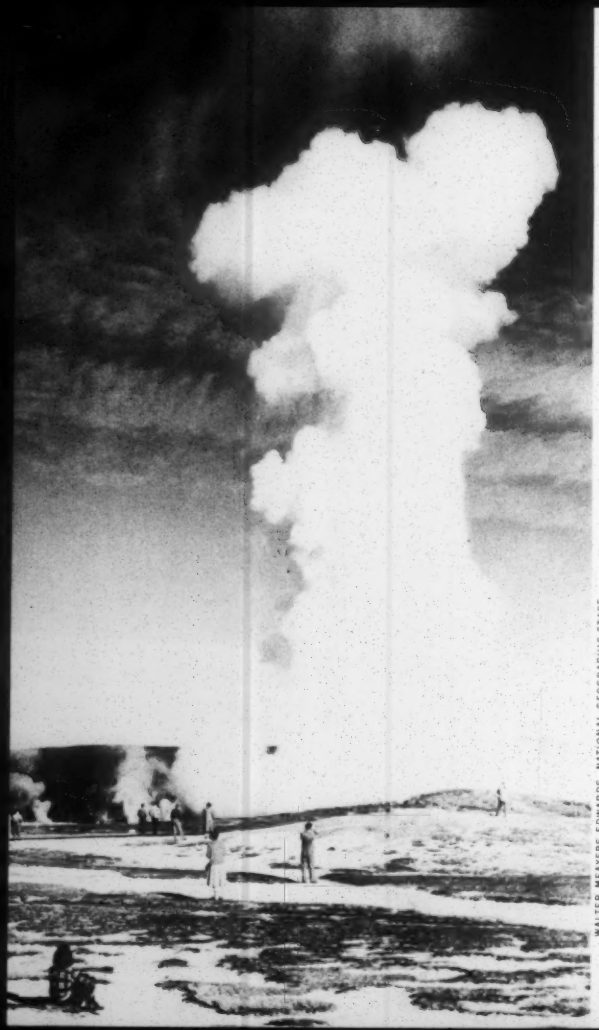
Most famous—and most regular—is Old Faithful (far left). Every 65 minutes, on the average, Old Faithful sends 10,000 to 12,000 gallons of superheated water flying into the sky. More than 200 other geysers dot the park. "Little Bulger," left, does its stint in remote Shoshone Basin.

The word "geyser" comes from the Icelandic *geysir,* "to rush furiously." Seventy miles from the capital of Reykjavik, in the midst of the barren lava fields above, dozens of geysers steam and spout within a circle of 10 miles.

New Zealand's geyser area lies within its North Island. One geyser near the resort town of Rotorua in 1900 became the granddaddy of gushers. It shot mud and water 1,500 feet in the air, as high as the Empire State Building. Then Waimangu simmered down to inactivity, as if gathering its strength for another mighty burst. A.P.M.

Maori women, native to New Zealand, cook their dinner in thermal springs almost in their backyard. Sulphur caves, boiling springs, spouting geysers, fumaroles, steaming crevices, mud pots, and glistening terraces built up by mineral-laden waters make the district surrounding Rotorua a thermal wonderland.

HOWELL WALKER, NATIONAL GEOGRAPHIC STAFF



WALTER MEAYERS EDWARDS, NATIONAL GEOGRAPHIC STAFF

GEYSERS — Hot Water Volcanoes

GEYSERS GIVE DRAMATIC clues to the hot, molten mass that lies beneath Earth's cool outer skin. In the manner that volcanoes spew liquid rock, geysers send up hot water and steam.

Three factors are required for a geyser: surface water, molten rock reaching close to Earth's surface, and a channel through hard rock between the two. Cold ground water seeps downward, collecting in a column whose base is trapped in the hot rock. The weight of water increases the pressure below, raising its boiling point. When the heat far exceeds that necessary to boil water at the surface, a head of steam builds, forcing some of the water from the channel above. With this release of pressure, much more water flashes into steam, violently flinging the main mass above the surface.

ANDREW H. BROWN, NATIONAL GEOGRAPHIC STAFF

"The Earth gave a rumble and the cone tossed out a tentative splash," writes the *National Geographic*'s Andrew H. Brown of an Old Faithful eruption (left). "Then a tall gush of water stabbed skyward with a swish and fell back. Higher and higher the column surged, tons upon tons of boiling water. With a roar, the glittering fountain and her veil of steam leaped 150 feet into the sky. Her force spent in minutes, Old Faithful gradually dropped her plumed head, graceful and unhurried."

cia, Essex, East Anglia, Kent, Wessex, and Sussex.

Mercia lay in what is now roughly the English Midlands. Gradually it gobbled up its neighbors, north, south, east, and west. King Offa, who gained the throne of Mercia in 759, ruled all England south of the Humber River and styled himself "King of the English." Only Northumbria lay outside his domain.

A rather advanced ruler for his time, he drew up a code of laws for Mercia which the later King Alfred used to frame his legislative reforms. He improved coinage, and founded the monastery of St. Albans.

But he never learned to like the Welsh, who were always raiding across his border, stealing good English sheep. And he often found himself fighting off ferocious Welsh armies.

In 784 his spadesmen dug what is today known as Offa's Dyke—a ditch averaging six feet deep and 12 feet wide with a rampart on the east side 10 feet high. It ran from the Firth of Dee to the Bristol Channel, thoughtfully leaving for the Celts the barren uplands, granting Mercians the fertile lowlands.

Known as Clawd Offa in Wales and Offa's Dyke in England, this bulwark remained the border between the two countries long after Offa's death in 796.

In the Middle Ages, the law was that any Welshman found east of the Dyke lost his right hand. For a second offense he was taught a more lasting lesson; he lost his head.

Worn down and obliterated in parts, much of the dyke can still be seen today. The present border between England and Wales no longer follows it exactly.

Now many a tweed-garbed stroller will walk the Dyke, hearing in imagination the bleat of stolen sheep, the rattle of spears, and the battle cries of Welshmen and Mercians of long ago.

Among the attractions which make for pleasant hiking, they will find Chirk Castle, below, a border fortress built in 1310. The old Dyke passes through its deer park.

ILLUSTRATIONS FROM BRITISH TRAVEL ASSOCIATION

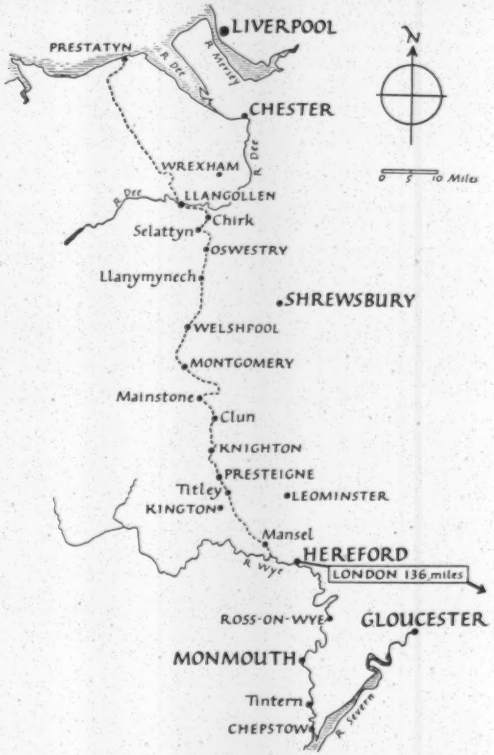
Offa's Dyke Divides English and Welsh

THROUGH the quiet Welsh countryside near Montgomery runs a grassy, tree-covered causeway—a relic of long-dead ferocity, now devoted to peaceful pursuits.

This 1,200-year-old rampart, known as Offa's Dyke, was thrown up by a powerful English king to wall off the Welsh in the same manner that the Great Wall of China fenced out the Mongols.

Today, England and Wales are firm friends, joined together in the United Kingdom. Together they have made this old sore spot a hiking path, with no weapon in sight more belligerent than a walking stick.

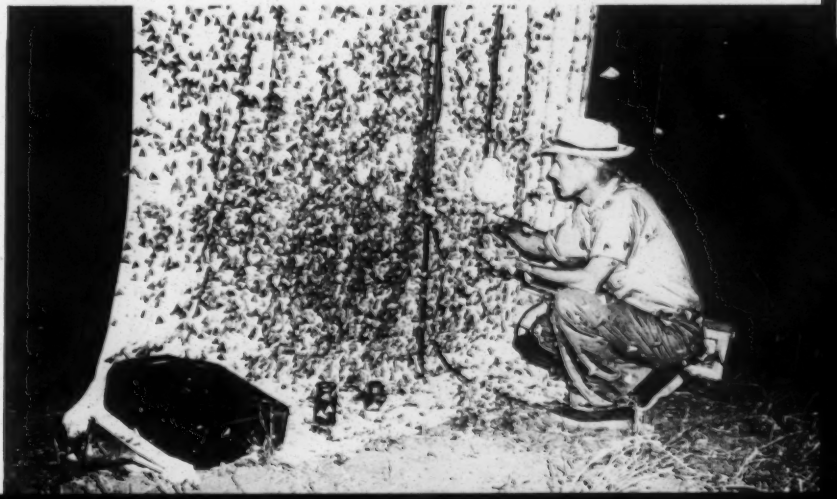
During the late 6th and 7th centuries, even the English couldn't get along with each other. They were divided into several kingdoms always engaged in nasty infighting: Northumbria, Bernicia, Lindsey, Mer-



Offa's Dyke followed approximately this course, from the Irish Sea at Prestatyn to Hereford. South of that point, it went along the River Wye. Most of the Welsh-English border today lies west of the dyke.

One of the worst of Africa's insect pests is the gray tsetse fly, shown at right sucking blood from the arm of Dr. Ross's assistant. The half-inch flies carry the micro-organisms that produce sleeping sickness in man, and a related disease in cattle. Dr. Ross's truck was stopped occasionally for inspection by net-waving "fly boys" who examined it for hitchhiking tsetses. Fortunately, few of the flies are infected, due to intensive treatment of human cases of sleeping sickness.

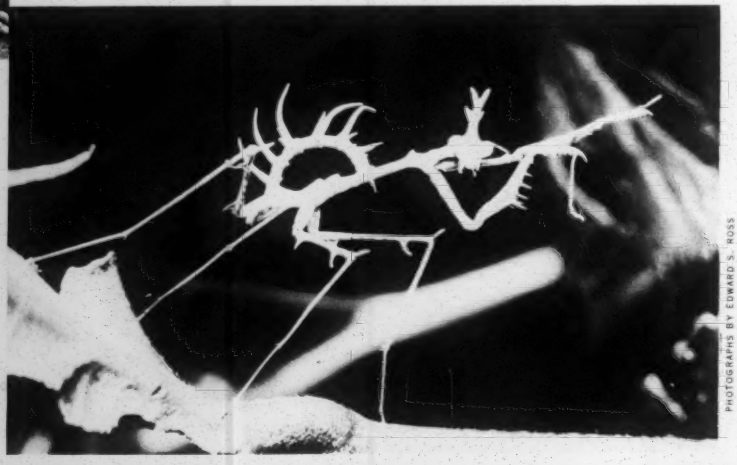
As big-game hunters lure their prey at night, so do the small-game hunters. The bait is a lamp in front of a white sheet. At right, on Madagascar, insects of hundreds of different species—some new to science—flock to the light, many resting on Dr. Ross as he examines his catch. A single night's bag, he reports, can keep museum workers busy for months. Since no one person can know everything about so vast a field, many specimens were sent to specialists in other institutions.



Intense concentration on the job brought some dangers. Dr. Ross, with eyes trained to spot bits of life hardly bigger than a grain of sand, stumbled upon a sleeping elephant in the Congo rain forest. F.S.

UMI

Miniature Trophies From Africa



PHOTOGRAPHS BY EDWARD S. ROSS

THE HUNTER CREEPS silently across the forest floor, eyes riveted to his prey. Every sense alert, he hears the soft rustle of a snake slithering out of his path; he smells the jungle blossoms. He leans forward, trigger finger tense. Now!

A blaze of light, a camera click, and another trophy is bagged.

The hunter is an insect expert, seeking the smallest game in Africa. Edward S. Ross, Ph.D., spent a year in Africa under the sponsorship of the National Geographic Society and the California Academy of Sciences. His 33,000-mile trek took him across field, bush, and forest, to 13 different countries or colonies. He passed through the Republic of the Congo just before revolution flared.

Among the strange creatures he photographed is the half-inch giraffe weevil, above left. This beetle, with scarlet wing covers glistening behind a tiny black head and long neck, lives on the island of Madagascar. Powerful jaws enable her to bore deep into plant tissue to deposit her eggs. Like the boll weevil of United States cotton fields, she is a plague to farmers.

The thorny creature at left is a young praying mantis, pretending to be a tasteless tuft of white lichen. Spines on its body and head combine with stillness to promote the deception, designed to fool larger insect eaters.

Related to the common mantis of North America, this inch-long insect is itself a predator, capturing smaller insects with its spiny forelegs.

The brown tailor ants at right share with man the ability to use tools. When Dr. Ross disturbed their nest in Angola, the ants repaired it by forming living chains between the leaves he had separated, slowly dragging them together again. Then other worker ants ran forward, each carrying a white larva in its mouth. As the larvae spun sticky silk threads, the half-inch adult ants moved them back and forth over the leaf edges to bind them together, as with needle and thread.

Death of a Grasshopper; Birth of a Wasp

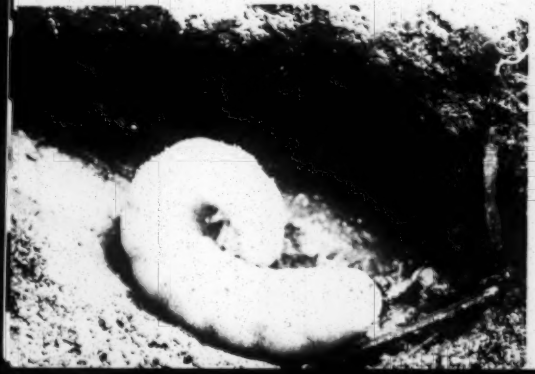
IN THIS REMARKABLE series of photographs, Dr. Edward S. Ross shows the life cycle of an African digger wasp. Other species raise their young in similar ways in North America.

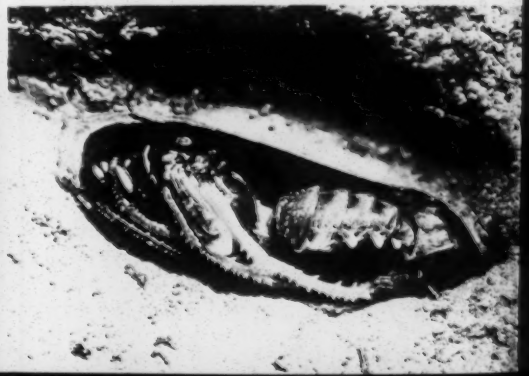
At top left, the female wasp scoops out dirt with jaws and forelegs as she starts a six-inch-deep burrow. Center left, she returns to the completed nest with a grasshopper she has paralyzed with her sting. On it she lays a comma-shaped egg, top right.

As the wasp larva grows, it eats up the grasshopper, finally lies among the indigestible parts, lower left. Then the larva spins a silken cocoon around itself to form a protected place to change from a white grub into a full-fledged wasp. The cocoon protects it against enemies and moisture.

In the final picture, the cocoon has been cut to show the wasp ready to emerge.

To make these pictures, Dr. Ross dug holes beside many burrows, then shaved away the dirt until the chambers were open.





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